



REQUEST FOR PROPOSALS

For

SHUTTLE LANDING FACILITY TOWER AIRCRAFT COMMUNICATIONS REPLACEMENTS

RFP-SF-01-0-2017/JM

Publication Date: November 10, 2016

Due Date: December 13, 2016

Space Florida ("SF") is dedicated to fostering the growth and development of a sustainable and world-leading aerospace industry in the State of Florida. SF promotes aerospace business development by facilitating business financing, spaceport operations, research and development, workforce development, and innovative education programs. SF is an independent special district and a subdivision of the State of Florida and is governed by Part II of Chapter 331 of the Florida Statutes.

STATEMENT OF WORK

SF is seeking competitive written proposals from qualified vendors to remove and replace existing communications equipment in SF's Shuttle Landing Facility, Air Traffic Control Tower (J6-1197) Kennedy Space Center, FL 32899. Refer to Attachment B for complete description and specifications of work to be accomplished.

Procurement Manager: All vendor communications concerning this solicitation should be directed in writing to the Procurement Manager listed below.

Name: Art Robbins
Address: Space Florida
505 Odyssey Way, Suite 300
Exploration Park, FL 32953
Telephone: 321-730-5301, Extension 210
E-Mail: arobbinst@spaceflorida.gov

Prospective vendors shall not contact, communicate with, or discuss any matter relating in any way to this RFP with any SF employee or SF board or committee member, other than the Procurement Manager. Any such communication initiated by a prospective vendor may be grounds for disqualifying the prospective vendor from consideration for award of this RFP.



INSTRUCTIONS TO VENDORS

Deadline and Delivery of the Proposal: All proposals must be received by the Procurement Manager no later than 12:00 Noon (EST) on Tuesday, December 13, 2016, Unless otherwise specified herein, proposals must be sealed in one package and clearly labeled “REQUEST FOR PROPOSALS FOR RFP-SF-01-0-2017/JM Shuttle Landing Facility Tower Aircraft Communications Replacement” on the outside of the package. Late proposals will not be accepted by the Procurement Manager. Vendors accept all risks of late delivery of mailed proposals regardless of fault. Faxed and e-mailed proposals will be deemed non-responsive.

Local Laws and Requirements: The vendor should become familiar with any local conditions, which may, in any manner, affect the services required. The vendor is required to carefully examine the RFP terms and to become thoroughly familiar with all conditions and requirements that may in any manner affect the work to be performed under the resulting contract. Prior to contracting with SF, owners of all forms of business doing business in the State of Florida, except sole proprietorships, must register with and be in good standing with the Florida Department of Corporations. A foreign corporation cannot transact business in the State of Florida until it obtains a certificate of authority from the Department of State.

Withdrawal of Proposals: A vendor may request a proposal be withdrawn from consideration prior to the date and time the proposals are due. Proposals that have been submitted to SF become a public record, subject to public record retention requirements.

Preliminary Schedule: These dates are estimates only and are subject to change by SF.



Event		
Legal Notice sent to Florida Today	11/8/2016	11:00 A.M.
RFP Posted on SF's Website and DemandStar	11/10/2016	12:00 Noon
Mandatory Site Visit Registration Deadline: All Participants must RSVP with the KSC Badging Form filled out and sent to: gbailey@spaceflorida.gov and copy jmoffitt@spaceflorida.gov , so that they will be given directions and authorization to enter the secured area for the Site Visit.	11/17/2016	12:00 Noon
Mandatory Site Visit	11/22/2016	10:00 AM
Question Submission Deadline*	11/29/2016	12:00 Noon
Question Responses Posted	12/06/2016	12:00 Noon
Proposals Due	12/13/2016	12:00 Noon
Proposals Evaluated – Procurement Manager (Stage 1)	12/13/2016 – 12/14/2016	N/A
Proposals Evaluated – Evaluation. Committee (Stage 2)	12/14/2016 – 12/15/2016	N/A
Notice of Intent to Negotiate	12/15/2016	N/A
Notice of Intent to Award	TBD	TBD
Award Announcement	TBD	TBD

*All questions must be submitted by e-mail to the Procurement Manager. All answers will be posted to the SF and DemandStar websites.

Site Visit: All interested vendors must attend Mandatory vendor site visit which will be held at: Shuttle Landing Facility Air Traffic Control Tower, (J6-1197) on Tuesday, November 22, 2016, at 10:00AM. Each vendor shall be limited to a maximum of two (2) attendees. The attendees will be required to fill out a NASA KSC Temporary Badge Form in Attachment D. All attendees must copy Jim Moffitt at: jmoffitt@spaceflorida.gov along with filling out the KSC Form and sending it to: gbailey@spaceflorida.gov, no later than 12:00 noon on: November 17, 2016, so that a list of Badge requests can be provided to NASA. On the day of the site visit all interested vendors shall meet at the NASA KSC Badging Station, State Road 405, Merritt Island, FL 32953, at 10:00AM. Once gathered, the vendors will be caravanned by SF to the SLF. If a vendor shows up at the gate without being on the list, they will not be able to access the site or the meeting.

Submittal Instructions: The proposal must be submitted on 8-1/2" X 11" paper, Times New Roman, 12-point font. Vendors must submit four (4) hard copies and one (1) soft copy on compact disk in Microsoft Word (.doc) or Adobe Acrobat (.pdf) format.

The Proposal Package is limited to 10 one-sided pages. Permitted exclusions to the Proposal Package limit are: Front cover and Back-cover pages, Title Page, Table of Contents, Index/Divider inserts, and Financial Statements.



Vendor's proposal shall **specifically** identify and address and include, in the same order presented below, each of the following Sections A-G, including each subsection. If there is no information to present for a specific section or subsection, state the reason such as "not applicable" or "there is no information that we wish to present". Failure to follow these instructions may result in a proposal being deemed non-responsive.

A. Title Page: Identify the RFP subject, RFP number, name of vendor, vendor address, vendor phone and facsimile number, primary point of contact, primary point of contact's title and e-mail address for receipt of notifications and date of submittal.

B. Table of Contents: Provide identification of the material by section and by page number.

C. Letter of Transmittal: The letter must be signed by a representative authorized to contractually bind the vendor, and include the title or authority of the representative. The letter shall not exceed two pages and it shall briefly state the understanding of the vendor regarding the work to be performed and make a positive commitment to perform the work within the specified time period. The letter of transmittal shall be limited to one (1) page. The following must be included:

1. Type of business (sole proprietorship, partnership, corporation, etc.)
2. State of incorporation.
3. Headquarters location and whether offices are located in the state of Florida, and if so, where.
4. The names and contact information of the persons who will be authorized to make representations for the vendor.

D. Profile and Qualifications: Experience and qualifications of the firm and staff:

1. Give a brief history of the organizational structure of the firm, including the organization's inception. Indicate number of employees, and identify if the firm has a minority, women, and/or service disabled veteran business status with the state of Florida.
2. Provide proof of legal entity and authorization to do business within the State of Florida.
3. Provide biographies of proposed project lead and other key members of the staff that will be assigned to this effort. The biographies shall include their position, years of experience, and similar success to SF's requirements.
4. Provide information on current or past performance in similar activities. Include three specific references with appropriate contact information, period of performance for specific engagement, and the value of services performed.
5. Indicate financial wherewithal and stability of firm.



6. Indicate any potential conflicts of interest with SF or at the vendor's firm, office, or engagement team level.
7. Describe the firm's single distinctive competency compared to other firms and include the three top factors which the vendor believes are key for a successful relationship.
8. Outline the proposed teaming arrangement, listing all team members and outlining how the team will be structured. State if the work will be performed using solely in-house resources.

E. Approach to RFP: The vendor shall clearly describe the proposed approach to providing the Statement of Work described above. The vendor should include a description of the method and schedule of installing the equipment to minimize shutdown of communications within the allowable work windows; and the approach to assuring full communications are in place at all times outside the designated work windows.

F. Pricing of Services: The vendor shall provide a fixed price fee for all services and expenses including any out of pocket and travel expenses associated with the services to be performed as outlined in the Statement of Work.

G. Additional Data: Since data not specifically requested should not be included in the foregoing proposal sections, provide any additional information considered to be helpful in the selection process in this section. Published manufacturers' cut sheet and materials data may be included in this section and would NOT count toward the 10-page proposal limit.

Rating Proposals and Award: Proposals will be evaluated in a two-stage process:

- Stage One: Proposals shall be reviewed based on the submittal instructions identified herein. All vendors who qualify based on the required submittal instructions shall proceed to the next stage.
- Stage Two: Proposals shall be ranked in accordance with SF's RFP Evaluation Criteria which shall be determined by at least three SF employees acting and scoring in an individual manner. Proposals received will be evaluated and ranked in accordance with the RFP evaluation criteria. A ranking will be established by totaling the sum of the scores. The RFP Evaluation Criteria Score Sheet for Stage Two is attached hereto as **Attachment A**.
- Optional: SF may interview the vendors or request that the vendors make presentations.

Right to Reject Proposals: SF reserves the right to make an award it determines to be in its best interests or to reject any and all proposals. Further, SF, in making its award decision, retains the authority to waive what it considers to be minor irregularities in the proposal or to seek clarification on certain issues from any vendor submitting a proposal. Failure to provide requested information may result in the rejection of the proposal.

Notice of Intent to Award: The Notice of Intent to Award will be posted on the SF and DemandStar websites.



Disputes: Failure to file a protest within the time prescribed in subsection 120.57(3) of the Florida Statutes, or failure to post the bond or other security required by law within the time allowed for filing a bond shall constitute a waiver of proceedings under chapter 120 of the Florida Statutes.

Property of SF: All information submitted by vendor will become part of the project file and, unless otherwise exempt or confidential in accordance with Florida law, will become a public record. All proposals and accompanying documentation will become the property of SF and will not be returned.

Trade Secrets and Information Confidential and Exempt from the Public Records Act: Trade secrets and information confidential and exempt from Subsection 119.07(1) of the Florida Statutes and Subsection 24(a) of Article I of the Florida Constitution, is not solicited nor desired, as information to be submitted with proposals. The Florida Statutes and the State Constitution govern whether information in a proposal is confidential or exempt from the Public Records Act. If information is submitted in the proposal which the vendor deems to be a trade secret or confidential and exempt from the Public Records Act, the information shall be submitted with the proposal in a **separate, clearly marked envelope referencing the specific statutory citation for such exemption**. Submitted proposals which are marked “confidential” (or other similar language) in its entirety or those in which a significant portion of the submitted proposal is marked “confidential” may be deemed non-responsive by SF. SF is not obligated to agree with the vendor’s claim of an exemption and, by submitting a reply or other submission, the vendor agrees to be responsible for defending its claim that each and every portion of the separately marked information is exempt from inspection and copying under the Public Records Act. The vendor agrees that it shall protect, defend, and indemnify, including attorney’s fees and costs, SF for any and all claims and litigation (including litigation initiated by SF) arising from or relating to vendor’s claim that the separately marked portions of its reply are not subject to disclosure. If the vendor fails to separately mark portions of its proposal, or mark its proposal “confidential” (or other similar language) in its entirety, SF is authorized to produce the entire document, data or record submitted by the vendor in responding to a public records request.

Compliance with Laws: Vendor shall comply with all laws, rules, codes, ordinances, licensing and bonding requirements that are applicable to this RFP and the conduct of vendor’s business, including those of Federal, State, and local agencies having jurisdiction and authority. By way of non-exhaustive example, the vendor shall comply with the Florida Sunshine Law and Public Records Act, Immigration and Nationality Act, the Americans with Disabilities Act, and all prohibitions against discrimination on the basis of race, religion, sex, creed, national origin, handicap, marital status, or veteran’s status. The selected vendor understands and will comply with subsection 20.055(5) of the Florida Statutes.

Convicted Vendors: Vendor affirms that it is aware of the provisions of Section 287.133(2)(a) of the Florida Statutes and that at no time has vendor been convicted of a public entity crime.



Discriminatory Vendors: Vendor affirms that it is aware of the provisions of Section 287.134(2)(a) of the Florida Statutes, and that at no time has vendor been placed on the discriminatory vendor list.

Vendor's Representation and Authorization: In submitting a proposal, the vendor understands, represents, and acknowledges the following (if the vendor cannot so certify to any of following, the vendor shall submit with its proposal a written explanation).

1. The vendor is not currently under suspension or debarment by the State or any other governmental authority.
2. The vendor, its affiliates, subsidiaries, directors, officers, and employees are not currently under investigation by any governmental authority and have not in the last ten years been convicted or found liable for any act prohibited by law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract.
3. The vendor has no delinquent obligations to the State, including a claim by the State for liquidated damages under any other contract.
4. The proposal is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive proposal.
5. The prices and amounts in the proposal have been arrived at independently and without consultation, communication, or agreement with any other Vendor or potential Vendor; neither the prices nor amounts, actual or approximate, have been disclosed to any Vendor or potential Vendor, and they will not be disclosed before the opening of the proposals.
6. Neither the vendor nor any person associated with it in the capacity of owner, partner, director, officer, principal, investigator, project director, manager, auditor, or position involving the administration of federal funds:
 - a. Has within the preceding three years been convicted of or had a civil judgment rendered against them or is presently indicted for or otherwise criminally or civilly charged for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a Federal, State, or local government transaction or public contract; violation of Federal or State antitrust statutes; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property; or
 - b. Has within the preceding three years of this certification had one or more Federal, State, or local government contracts terminated for cause or default.

Vendor's Cost to Develop Proposal: Costs for developing proposals responsive to this RFP are entirely the obligations of the vendor and shall not be chargeable in any manner to SF.



Attachment A

RFP Evaluation Criteria Score Sheet for Stage Two



Evaluation Criteria Score Sheet: Vendors will be evaluated on the following criteria:

Item #	Selection Criteria	Score Range
1.	Profile and Qualifications- Vendors and Subcontractor (if any) qualifications, financial soundness and relevant experience.	10
2.	Background/Key Personnel- Vendor's experience, qualifications of key personnel and references.	10
3.	Proposed Approach- Vendor's proposed approach to providing the services as described in the Scope of Services.	20
4.	Schedule/Timeline- Does the vendor's proposed schedule and timeline meet the goals of Space Florida?	10
5.	Other Relevant Factors/Additional data – (Pricing) As set forth in subsection 287.055(4) of the <i>Florida Statutes</i> . Additional information relevant and pertinent to the proposal.	50
	Total	100 Possible



Attachment B

Statement of Work



Statement of Work

Shuttle Landing Facility Tower Aircraft Communications Replacements

Part 1 – General Description

The existing aircraft communications system equipment in the Air Traffic Control Tower (ATCT) at the Shuttle Landing Facility (SLF) at Kennedy Space Center has become obsolete and much, if not all, of the equipment is no longer supported by the original manufacturers. Space Florida wishes to maintain and operate the ATCT communications system equipment in a similar fashion as other standard Federal Aviation Administration ATCT's around the United States.

Part 2 – Scope of Work

Refer to and review all exhibits provided within Attachment C. The vendor shall provide, install, program and test a General Aviation Radio Communications System (radio system) to accomplish voice communications at SLF ATCT for both Air and Ground operations. The vendor shall remove existing equipment that is replaced to be turned over to NASA.

Part 3 – Pay Items

Refer to and review all exhibits provided within Attachment C. The vendor shall provide bid prices for the following pay items. SF reserves the right to award all, none or components of pay items listed below. The prices shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

No.	Description	Unit	Qty	Unit Price	Total Amount/Item
1	Removal of existing equipment to turn over to NASA	LS	1	\$	\$
2	Three (3) Transceiver Radios to operate on VHF frequencies	LS	1	\$	\$
3	One (1) Console System that will support at least 3 positions	LS	1	\$	\$
4	One (1) Voice Recording System to record and store radio communications	LS	1	\$	\$
5	VHF Antennas dedicated for each transceiver radio	LS	1	\$	\$
6	Installation and interface materials and equipment required for the radio system	LS	1	\$	\$
7	Emergency Tunable Radio to be used for emergency back-up communications	LS	1	\$	\$

Total for all Items



Attachment C

List of Exhibits

1. Location Map.
2. Technical Memo: SLF Tower Aircraft Communications Replacement.
3. Performance Specification: Shuttle Landing Facility Tower Communications Replacement.
4. Relevant Record Drawings 79K35795 for Design Air Traffic Control Tower Shuttle Landing Facility, (To be handed out at Site Visit.)

Exhibit 1

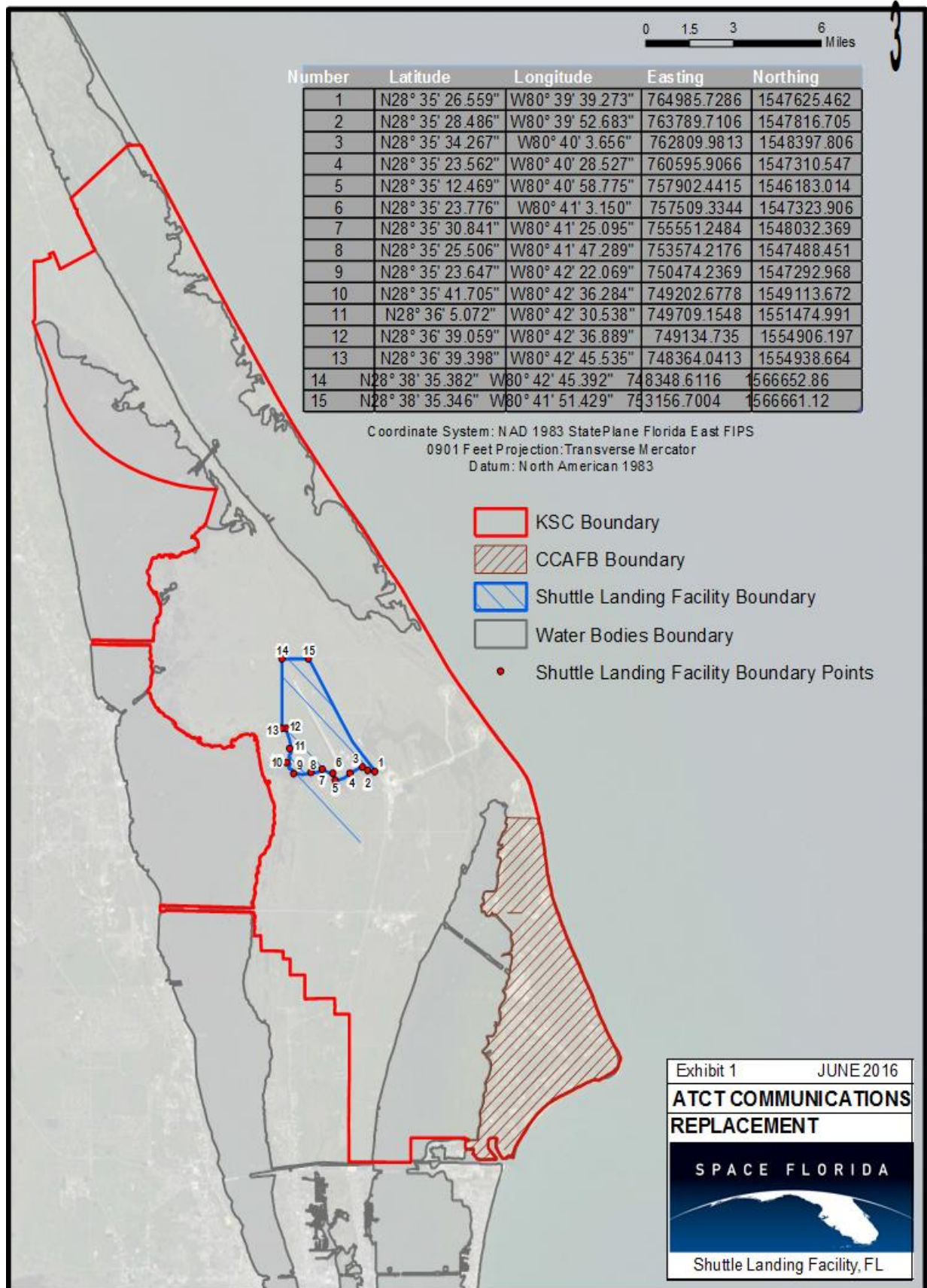


Exhibit 2



Florida Department of Transportation
Aviation and Spaceports Office
Spaceport Program and Project Development Services
Contract Number C9C69
Task Work Order #11

Task 14 – Shuttle Landing Facility Tower Aircraft Communications Replacement

Final Technical Memo SLF Tower Aircraft Communications Replacement

Prepared for:
Florida Department of Transportation
and
Space Florida

Dated:
June 2, 2016

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Executive Summary

The existing aircraft communications system equipment in the Air Traffic Control Tower (ATCT) at the Shuttle Landing Facility (SLF) at Kennedy Space Center has become obsolete and much, if not all, of the equipment is no longer supported by the original manufacturers. Space Florida wishes to maintain and operate the ATCT communications system equipment in a similar fashion as other standard Federal Aviation Administration ATCT's around the United States.

To continue operations of the SLF, Space Florida must continue to provide radio communications for ATCT operations. This requires the acquisition of a replacement radio system, or radio system components that will be integrated into a complete system, which complies with the standards of today's modern aviation communications.

The system components that need to be replaced are:

- Transceiver Radios
- Console System
- Voice Recording System
- Antennas
- Emergency Tunable Radio

In March 2016, AECOM was tasked with reviewing the current communications system at the SLF ATCT and researching up-to-date technologies available to replace the existing radio communications system. AECOM has identified current communications equipment that complies with the latest standards for aviation communications, and has also investigated potential options for a portable back-up communications system.

This Tech Memo documents AECOM's review of the existing system and identification of key components for the replacement of the ATCT communications system. AECOM has solicited equipment quotes from multiple communications equipment vendors and aviation communications system integrators. The pricing information, from the potential vendors contacted that provide a turn-key system integrated solution, is provided in Appendix A. Recommendations for specifying equipment associated with a procurement request are included later in this document.

1. Existing Radio Communications System

1.1 Transceiver Radios

The existing General Dynamics aviation radios are located in an equipment room on the fifth floor of the ATCT just below the control cab. The transceiver radios receive voice audio from the console system and transmit radio signals to be received by the aircraft. The transceiver radios also receive transmitted radio signals from the aircraft and send voice transmissions to the console system.

The existing transceiver radios at the SLF operate in both the Ultra High Frequency (UHF) and Very High Frequency (VHF) bands, and consist of the following frequencies:

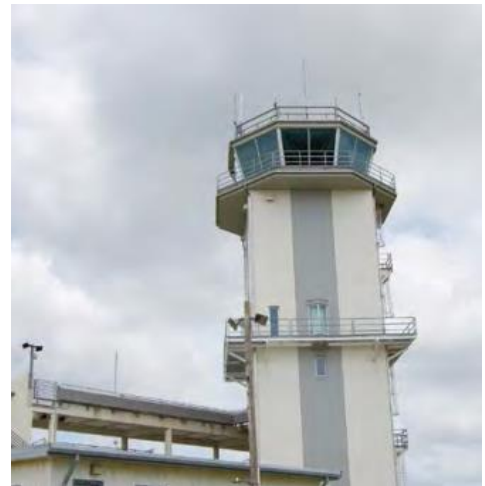
- Tower (UHF) - 284.00 MHz
- Approach/Departure (UHF) – 265.80 MHz
- UHF Emergency – 243.00 MHz
- Tower (VHF)/CTAF – 128.55 MHz
- Approach/Departure (VHF) – 133.80 MHz
- VHF Guard/Emergency – 121.50 MHz
- Weather/Support – 126.65 MHz
- Ground Control – 121.75 MHz



**General Dynamics Radio
Transceivers**

1.2 Antenna System

The existing antennas for the UHF and VHF frequencies listed above are mounted on the roof of the ATCT. There is a separate coaxial transmission line for each transceiver running through conduit from the fifth floor equipment room to an associated antenna on the roof.



ATCT Roof Mounted Antennas

1.3 Console System

The existing console system is a Harris Liberty-STAR (formerly Solacom) console system with three (3) user interfaces positions in the control cab of the ATCT. The console server is located on the fifth floor of the ATCT just below the control cab next to the radio rack. This is the functional interface for the controller to interact with the various communication functions of the system.

The console system sends and receives audio to/and from the transceivers via 4-wire audio, and can also be configured to control and/or monitor other paths of communication to the tower such as telephone and shout lines. The existing console system is integrated to a Voice Recording System.



Console System User Interface

1.4 Voice Recording System

The existing voice recording system is a Verint voice recorder located in the control cab of the ATCT. The existing voice recorder records all radio transmissions, and all calls on the phone lines in the tower.



1.5 Emergency Tunable Radio

An existing emergency radio is available for use in the event of a catastrophic failure at the tower, and/or the radio system.

The existing emergency radio system is a Motorola Pet 2000, which has been discontinued, but may still be available in the aftermarket. It can be tuned to the SLF frequencies, and is configured with the combined components (including speakers, antenna and power supply) in a hardened case, so that it can be moved to a safe location, if necessary, to perform continued tower and ground communications.



Motorola Pet 2000

2. Replacement Radio Communications System Requirements

The preference for the replacement system is that all of the major components of the system use the ED-137 Voice-over-Internet Protocol (VoIP) standard. If cost, and or availability, creates circumstances where ED-137 is not utilized, then appropriate interfacing between the various components must be ensured between the manufacturer(s) of the equipment.

It should be noted that Space Florida will require a turn-key solution. Potential vendors shall include a price for all installation and testing of the new system, as well as removal of the old equipment. If the vendor does not provide installation or equipment testing directly, then it is preferable that a partner for the manufacturer be identified for installation and testing services.

If neither of the aforementioned options is available, then a third party integrator/installer that is familiar with the equipment shall be utilized.

2.1 Transceiver Radios

It is expected that the existing equipment racks on the fifth floor of the ATCT will remain in place for the new transceiver radios. Each transceiver radio shall have a dedicated antenna on the roof of the ATCT.

Three transceiver radios will be required to operate on the following frequencies that will be used at the SLF:

1. Tower to Air (VHF) – 128.55
2. Tower to Ground (VHF) – 121.75
3. Air Emergency/Guard (VHF) – 121.50

Note: The existing Tower to Ground (VHF) frequency (121.75) has a band pass filter which rejects the Air Emergency/Guard VHF frequency (121.50) because of insufficient spacing between the frequencies. See photo detail of band pass filter in Appendix B – Additional Photo Details of Existing Equipment.

2.2 Antenna System

The existing VHF antennas will need to be replaced. It is anticipated that the existing radio frequency (RF) cabling can remain in place and be re-used. Since the existing UHF frequencies will no longer be used, the UHF antennas should be removed from the roof. The vacated spaces from the removal of the UHF antennas provide additional options to be considered in determining the optimum placement of the new VHF antennas.

Note: Use of the existing RF cabling from the removed UHF antennas could be considered to aid in the relocation of the VHF antennas to new locations on the roof, if desired.

As part of the installation of the new antenna system, all existing RF cabling from the equipment room on the roof of the control cab will need to be verified to be of sufficient length and tested for proper functionality.

Note also: There is a junction box on the roof of the tower where the RF cabling from the equipment room terminates. From this rooftop junction box, other RF cables are used to complete the RF path to the mounted antennas on the roof.

Vendors shall confirm that their equipment will be able to function without interference being introduced by other nearby frequencies. For instance, the Tower-to-Ground and the Air/Emergency Guard frequencies are only 250 kHz apart. If the proposed base station equipment cannot operate without interference from potential interfering frequencies, then external filtering must be provided to allow concurrent operation.

It is not currently known what RF power level the current General Dynamics radios are operating. The RF power level output of the transmitter should be capable of producing the Effective Radiated Power (ERP) level at the antennas for which the frequencies are currently licensed.

2.3 Console System

It is expected that the existing cabinetry in the control cab shall be re-used for the new console system. The new console system will need to support at a minimum 3 console interfaces in the control cab, and provide enough audio interfaces for all monitored devices which include the following:

- 3 Radio Channels
- Phone lines
- Shout lines

The transceiver radios shall be connected directly to the console system. The replacement console system should have several interfaces for various audio formats such as analog and VoIP. The replacement console system server equipment may be placed on the fifth floor of the ATCT where the existing console equipment is located.

2.4 Voice Recording System

The new voice recording system will interface with the console system such that all voice communication activity for the communications system will be recorded and stored. The voice recording system should also have additional interfaces for other 4-wire audio cables, or VoIP connections.

If the new voice recording system equipment is located in the fifth floor ATCT equipment

room, then a network PC “terminal” for the voice recording system shall be installed in the control cab.

Recorded messages should have the capability of being reviewed directly at the recording server, or a remote terminal can be used for reviewing and selectively saving archived audio messages. There should be adequate room in the fifth floor equipment room and the control cab for this equipment.

2.5 Global Positioning System (GPS) Time System

The timing source for the current system is not known; however, the replacement communications system will require a GPS based timing system that provides accurate date and time information. The voice recording system will require accurate date and time information for time stamping recorded events. Also, the correct date and time needs to be clearly displayed in the control cab. There should be adequate room in the fifth floor equipment room and the control cab for this equipment.

2.6 Emergency Tunable Radio

An emergency radio should be available for use in the case of a catastrophic failure at the tower and or failure of the radio system. The tunable radio should be able to be moved to a safe location, if necessary, and set up to perform continued communications on the SLF frequencies.

The emergency radio should consist of radio system components that are consolidated into a hardened case. These system components include:

1. Transceiver radio that can be tuned to SLF frequencies
2. Radio speaker
3. Antenna connection mounted on the case
4. Antenna
5. DC power supply (both a battery and an AC/DC converter if AC Power is available)

Recommended models for the mobile transceiver radio are:

- Dittel FSG2T
- ICOM IC-A120
- Flightline FL-M1000A

3. Removal of Existing Equipment

The equipment being replaced will need to be returned to NASA. As a result, all equipment being replaced will need to be carefully removed and stored in a location designated by Space Florida.

Removal of the existing equipment and installation of the new equipment should be planned and coordinated with Space Florida so that minimal downtime for radio communications is experienced.

4. Transition Planning for Cutover to New System Equipment

As part of the planning to transition to the replaced radio system equipment, the following should be done *prior* to the removal of the old equipment and cutover to the new system.

1. A cutover plan of the equipment replacement steps shall be developed by the vendor/integrator, and reviewed and approved by Space Florida.
2. As-built drawings and documentation of the new equipment set-up should be created by the vendor/integrator, and reviewed and approved by Space Florida.
3. Acceptance test plans for the testing of the equipment functions and features of the replaced equipment, and for the testing of the radio coverage of the new system shall be developed by the vendor/integrator, and reviewed and approved by Space Florida.
4. The new equipment should be staged, configured and tested for proper functioning prior to the removal of the old equipment. The staging should include all equipment, wiring, cabling and connections prepared for final installation. Configuration should include all programming and functioning of the equipment and features where possible. Space Florida shall be allowed to witness the demonstration testing of the staged equipment per the functional acceptance test plan.
5. If possible, Space Florida personnel shall receive training on the use, operation, and maintenance of the new equipment.

The date and time for the replacement and cutover should occur and be completed during non-peak / non-active hours during a weekend, as agreed upon by Space Florida.

1. After installation is complete, functional acceptance testing shall be conducted. Space Florida shall be allowed to witness and participate in the functional testing per the functional acceptance test plan.
2. Coverage testing of the new system shall be conducted. Space Florida shall be allowed to witness and participate in the coverage testing per the coverage acceptance test plan.

3. Any additional programming and configuration of the system features, and training on the use of the system operation that were not performed during staging shall be completed.
4. After the successful completion of the functional and coverage acceptance test plans and cutover to full operation of the new system, the old equipment should be carefully moved and stored in a location designated by Space Florida.
5. As-built drawings and documentation shall be finalized to include mark-ups or changes that occurred during installation. The final documentation shall be approved by Space Florida and provided to them.

5. Pricing Information

Several requests for preliminary price quotes were placed to vendors and integrators of aviation communications, and supporting, equipment for the Space Florida control tower communication replacement project. Three quotes were received for fully integrated (turn-key) systems. These vendors were:

- Rohde & Schwarz
- Wolen LLC
- ACG Systems

Several other quotes from other vendors were received for various components of the system. These quotes are for comparison purposes, or can be used if only those components are going to be replaced.

Please note that not all vendors/integrators can provide all the needed equipment. There are also some options that were provided along with the quotes received from the vendors/integrators that have been added into the cost comparison table in Appendix A.

6. Recommendations

AECOM recommends that Space Florida selects a vendor that can provide a turn-key solution. This will provide better maintenance and support, and make the replacement radio system easier for the radio users to operate. Therefore, only the integrated system bids should be considered and are discussed below.

Observations of the quotes from Rohde & Schwarz, Wolen LLC, and ACG Systems are discussed below. Note: it is difficult to directly compare individual component costs within the quotes from the various vendors, however, what can be compared are the total hardware and installation costs quoted by the vendor/integrators.

Vendor	Hardware	Installation	Training	Removal of Old Equipment
Rohde & Schwarz	\$154,960.00	\$22,896.00	\$16,200.00	Not Quoted
Wolen LLC	\$95,054.00	\$27,300.00	Not Quoted	Not Quoted
ACG Systems	\$161,377.00	\$100,000.00		Not Quoted

Details for these prices are included in Appendix A.

From a cost only perspective, the ACG Systems proposal is the most expensive.

Rohde & Schwarz

The Rohde & Schwarz prices are from the original quote that had the hardware costs summed up with an optional “Commissioning” (installation) quote. Included in the hardware cost is an added base station, since Rohde & Schwarz quoted a price for (2) transceivers and (3) are needed.

The Rohde & Schwarz system is a fully integrated system that utilizes Rohde & Schwarz components throughout the system. All of these components are ED-137 compliant. Rohde & Schwarz also added optional quotes for training and spares which were not included in the Wolen LLC quote. Rohde & Schwarz is based in Germany and they produce a large variety of high quality electronic equipment. There is an advantage to having a system where all of the components are from the same manufacturer in that when a problem presents itself, the manufacturer is in a better position to troubleshoot, or reconfigure, from a system-wide perspective.

Wolen LLC

The Wolen LLC hardware prices in the table above are derived from the original quote, in which Wolen LLC added Labor & Travel as part of their overall quote (labor and travel was not added in the Rohde & Schwarz overall quote, but was added as an option). Subtracting the Labor & Travel from the original Wolen LLC quote leaves the hardware cost only, so that the comparison with Rohde & Schwarz can be made.

Wolen LLC is a local business that has extensive experience in the aviation community. They are familiar with the existing equipment and facilities at the SLF Tower. Wolen LLC has stated that their labor and installation costs include full staging of the system at their Merritt Island, FL facility. Staging will include all components prepared to the point so that when staging is complete, all that remains to be done is install the system in the tower and turn it on.

While the components of Wolen LLCs proposal are not ED-137 compliant, they have proposed an integrated system that will meet the requirements of Space Florida. An advantage of going with the Wolen LLC proposal, in addition to the reduced cost, is that they are conveniently located nearby for faster resolution of any issues that may occur.

It should be noted that Rohde & Schwarz included an optional quote for training which was not included with the Wolen LLC quote. Quotes for required training may need to be obtained directly with the equipment vendors chosen by Wolen LLC (such as for the console, and voice recorder), or perhaps through arrangements made with Wolen LLC.

ACG Systems

ACG Systems is headquartered in Annapolis, Maryland. They are system integrators of both military and civilian aviation communication systems. In addition to designing and integrating communications solutions for their clients, ACG Systems also provides a nationwide support network to provide maintenance service. ACG Systems has experience with implementing ED-137 compliant equipment. The preliminary quote from ACG Systems combined integration, engineering, site survey(s), installation, installation equipment, training, project management, and documentation into one item (\$100,000.00).

Note: Costs for the new antennas, emergency tunable radio, and for the removal of the existing system are not included in the quotes from the vendors. These costs, however, are included in the rough order of magnitude table below.

Based on the quotes and information provided by available manufacturers, a rough order of magnitude (ROM) cost for replacement of the system is shown in the table below.

Rough Order of Magnitude (ROM) Cost for Replacement System

Equipment	\$170,000
Training, Commissioning & Spares	\$50,000
Removal of Existing Equipment	\$20,000
25% Contingency	\$60,000
Total	\$300,000

7. Appendix A – Cost Comparison

Component Vendor_Manufacturer	WolenLLC	Rohde & Schwarz	ACG Systems
Console	\$40,000.00		
Computer Touchscreen (Console Interface)	\$1,500.00		
Position Speakers	\$188.00		
Controller Working Positions		\$29,514.00	\$42,750.00
VHF Transceivers	\$33,000.00	\$37,587.00	\$57,342.00
VHF Radio Filters	\$2,593.00		
Voice Recorder	\$13,563.00	\$18,360.00	\$15,500.00
Ethernet Switch		\$4,580.00	
Time Code Generator/Master Clock	\$990.00		
Time Clock Display	\$720.00		
Timing System and VCMS		\$23,625.00	
VCS Related Services		\$41,294.00	
Cabinet Modifications	\$2,500.00		
Labor & Travel	\$27,300.00		
Misc. Warranty & License			\$30,445.00
Misc. Hardware			\$15,340.00
Integration, Installation, Training, Site Survey(s)			\$100,000.00
Total Cost	\$122,354.00	\$154,960.00	\$261,377.00

Options			
Optional Training		\$16,200.00	
Optional Commissioning		\$22,896.00	
Optional Spares		\$15,865.00	
Options Total		\$54,961.00	

8. Appendix B – Additional Photo Details of Existing Radio System Equipment



Antennas looking SW



Antennas looking NW



Antennas looking N



Antennas looking E



Antennas looking SE



Antenna Panoramic



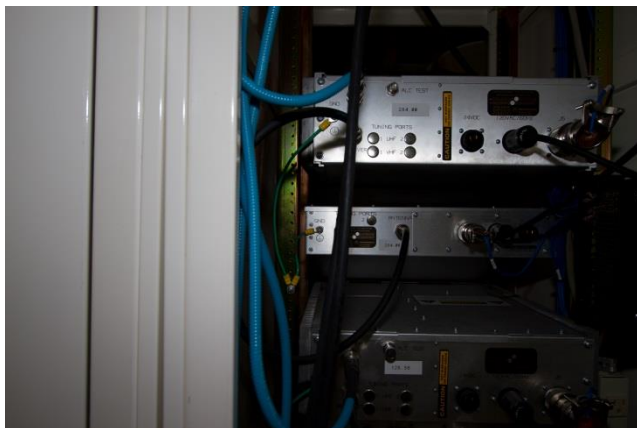
Antenna mounted on rail and connected to ground.



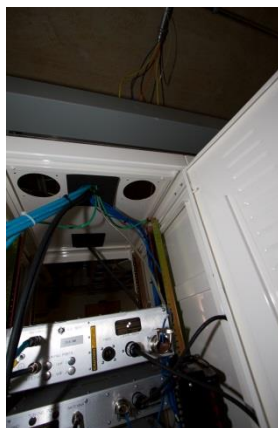
RF Cables from equipment cabinet (blue) connect to antenna cables (black)



Cabinets in the Equipment Room



Rear of Radio cabinet



Rear of Radio cabinet RF Cable exit



Audio patch panel for radio



Bandpass Filter



Audio Interconnect



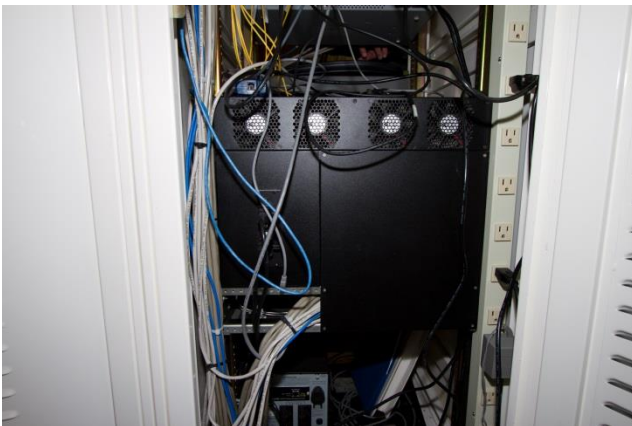
Detailed Audio Interconnect



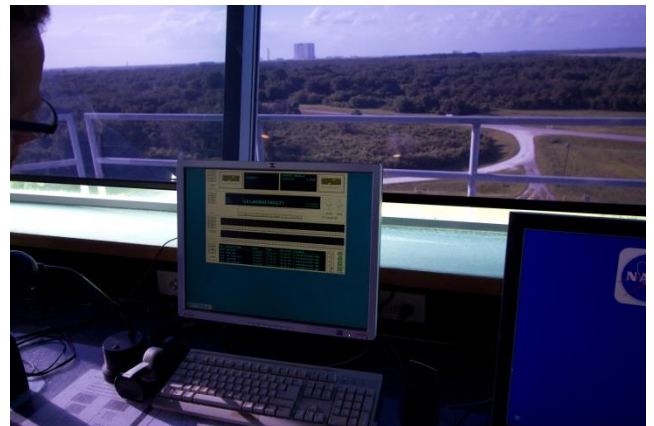
Solacom Cabinet



Solacom Front



Solacom Rear



Verint Voice Recorder



Florida Department of Transportation
Aviation and Spaceports Office
Spaceport Program and Project Development Services
Contract Number C9C69
Task Work Order #11
Task 14 – Shuttle Landing Facility Tower Aircraft Communications Replacement

Final Performance Specification SLF Tower Aircraft Communications Replacement

Prepared for:
Florida Department of Transportation
and
Space Florida

Dated: June 2, 2016

AVIATION RADIO COMMUNICATIONS SYSTEM

PART 1 – GENERAL

1.01 DESCRIPTION:

Provide, install, program and test a General Aviation Radio Communications System (radio system) to accomplish voice communications at the Shuttle Landing Facility (SLF) Air Traffic Control Tower (ATCT) for both Air and Ground operations. The SLF ATCT is located at the Kennedy Space Center in Titusville Florida. Remove existing equipment that is replaced.

The primary components of the radio system to be replaced are:

1. Three (3) Transceiver Radios to operate on VHF frequencies
 2. One (1) Console System that will support at least 3 positions
 3. One (1) Voice Recording System to record and store radio communications
 4. VHF Antennas dedicated for each transceiver radio
 5. Installation and interface materials and equipment required for the radio system
 6. Emergency Tunable Radio to be used for emergency back-up communications
-
- A. The vendor/integrator shall provide all equipment, materials, labor, design, and coordination services necessary to complete or perfect all parts of the Aviation Radio Communications System, and to ensure that they are in compliance with requirements stated or reasonably inferred by this Specification. Wherever the term “provide” or “provided” is used, it shall be defined as “procure, install and program as required for a fully functional and correctly operational System.” All equipment under this Section shall be provided, maintained and operated during the construction and implementation period, tested, and commissioned by the vendor/integrator.
 - B. The vendor/integrator shall perform all required coordination with SLF to finalize all functional, operational, and performance requirements of the radio systems. This shall include, but not be limited to; site investigation and verification, design workshops, coordination meetings, and review workshops. Interim and final design documentation shall be submitted for review and approval by SLF prior to proceeding with any installation work.
 - C. The radio system shall operate on Federal Communication Commission (FCC) licensed Very High Frequency (VHF) aviation frequencies. The replacement radio system shall be compliant with all FCC and Federal Aviation Administration (FAA) rules and regulations.
 - D. The radio system components are replacements for components currently being used at the SLF ATCT. Considering this, the existing cabling and any other miscellaneous equipment that is not required to be replaced, may be re-used for the radio system if practical to do so. The existing equipment racks on the fifth floor of the ATCT should remain in place for the new transceiver radios.

- E. Current radio system components that will not be replaced and that will remain with the new system (such as mounting hardware, cabling, connectors, grounding and lightning protection, etc.) will be tested to ensure they are properly functioning.
- F. Old equipment that is replaced shall be carefully removed and properly stored in a single location, designated by SLF. This equipment is owned by and will remain the property of National Aeronautics and Space Administration (NASA).

1.02 REFERENCES:

- A. American National Standards Institute (ANSI).
- B. American Society for Testing and Materials (ASTM).
- C. National Electrical Manufacturers Association (NEMA).
- D. Electronic Industries Association (EIA).
- E. National Electrical Code (NEC).
- F. National Electrical Safety Code (NESC).
- G. Electronics Industries Association (EIA)
- H. National Fire Protection Association (NFPA)
- I. Federal Communications Commission (FCC) Part 90: Code of Federal Regulations
- J. Federal Aviation Administration (FAA) 6510.4A: Radio Communications Requirements for Air Traffic Control Facilities.
- K. Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin: (TSB-88) Wireless Communications Systems
- L. Motorola R56 Radio Site Installation Guidelines

1.03 SUBMITTALS:

Provide the following information on the equipment and the installation plans:

- A. A cutover plan of the equipment replacement steps shall be developed by the vendor/integrator, and reviewed and approved by Space Florida prior to the removal of the old equipment and cutover to the new system. The plan should outline a phased approach for the removal of existing equipment and installation of the new system that will minimize the down time of ground to ground and ground to air communications. The maximum down time allowed is 63 hours from 5:00pm Friday afternoon to 8:00am Monday morning, unless otherwise approved. Space Florida shall allow two (2) separate 63-hours weekend windows for construction of the project. The vendor/integrator can inspect and plan for construction activities, without doing any construction, during the regular work week as approved by Space Florida.

- B. Overall system block diagram detailing equipment locations, antenna placement, hardware placement, cable runs, rack and equipment panel arrangements and layouts.
- C. A functional description of the block diagram. Describe the overall system operation, interaction between system elements, and system operator interactions.
- D. Include the manufacturer's name and model number for each hardware item shown on the block diagram, as well as auxiliary equipment such as power supplies.
- E. System architecture drawing showing the transceiver radios, antennas, logging recorder, console system, and network connectivity diagrams showing cable types and device terminal numbers.
- F. Link budget analysis showing predicted coverage or expected RSSI signal level for the SLF.
- G. Functional Acceptance Test Plan to test and verify the proper operation of functions and features of the radio system and components. The test plan shall be approved by SLF prior to conducting the tests.
- H. Coverage Acceptance Test Plan to test and verify that the coverage and voice quality of the radio system satisfy the requirements of Section 3.03 Demonstration. The test plan shall be approved by SLF prior to conducting the tests.
- I. Manufacturer data sheets of all system components.
- J. Manufacturers' instructions for storage, handling, protection, examination, preparation, operation, and installation of all products. Include any application conditions or limitations of use stipulated by any product testing agency.
- K. The Ethernet IP network that will support interconnection of the radio system will be provided by Space Florida. Provide a detailed list of the needed network connections including: number of paths, to/from locations, termination types, number of IP addresses.
- L. All applicable Material Safety Data Sheets.
- M. Operations and Maintenance Manual to include all components of the Aviation Radio Communications System.
- N. Warranty: The vendor/integrator shall provide a joint written warranty by the manufacturer(s) and the installer(s) of all equipment and services identified in this Specification, on a single document. The warranty shall warrant complete installation of the equipment, system, and software and firmware to be free from defects in materials and workmanship for a period of no less than twelve (12) months. The starting point for the warranty shall be from final system acceptance of the complete system.

1.04 QUALITY ASSURANCE:

Standard Products: Material and equipment to be the latest standard products of a manufacturer regularly engaged in the manufacture of the products. All equipment shall be new and have an expected system life cycle of 15 or more years. All equipment shall be installed in a neat and workmanlike manner.

1.05 SYSTEM OPERATION:

- A. The radio system shall provide clear two-way voice communications between users throughout the property boundary of the SLF. The radio system shall provide clear two-way voice communications to aircraft in the Class D Airspace of the SLF.
- B. The minimum voice quality for the communications shall be "Speech understandable with repetition only rarely required, and with some noise and/or distortion."
- C. The radio system shall provide two-way communications without interference or crosstalk from other radio systems.
- D. The Console System shall provide volume control and selection of channels.

PART 2 – PRODUCTS

The VHF radio infrastructure and console system shall be standard aviation communications equipment. The system shall support at least three (3) licensed frequencies:

- Tower to Air – 128.550
- Tower to Ground – 121.750
- VHF Air Emergency/Guard – 121.500

2.01 Transceiver Radios:

- A. Quantity – Three (3) transceiver radios that can both transmit and receive shall be provided for the radio system. The 3 transceiver radios will be required to operate on 3 VHF frequencies used at the SLF ATCT.
- B. Characteristics – The transceiver radios will operate within the General Aviation VHF band. The units shall operate in ambient temperatures from -30°C to +60°C (-22°F to +140°F). The transceiver radios shall be capable of being mounted in an EIA standard 19-inch rack. The radios shall contain a 120 VAC, 60 Hz power supply and be connected to the facility's UPS system. The radios shall be grounded to the building ground.
- C. Compliance – The transceiver radios shall be in compliance with all FCC and FAA regulations.
- D. Manufacturers:
 - 1. General Dynamics (currently installed)
 - 2. JOTRON
 - 3. Rockwell Collins
 - 4. or equivalent

2.02 Console System:

- A. Quantity – One (1) Console system that will support at least 3 positions and interface to the transceiver radios and voice recording and logging system.

- B. The replacement console system should have several interfaces for various audio formats such as analog and VoIP.
- C. The new console system will need to support at a minimum 3 console interfaces in the CAB, and provide enough audio interfaces for all monitored devices which are:
 - 1. 3 Radio Channels
 - 2. Phone lines
 - 3. Shout lines
- D. Manufacturers:
 - 1. Harris (Liberty-STAR currently installed).
 - 2. Telex
 - 3. Zetron
 - 4. or equivalent
- E. It is expected that the existing cabinetry in the CAB will be re-used for the new console system.

2.03 Voice Recording and Logging System:

- A. Quantity- one (1) Voice recording and logging system shall be provided for the radio system.
- B. The voice recording and logging system shall provide an interface to the console operator position, for recorded audio playback.
- C. The voice recording and logging system shall have additional interfaces for recording 4-wire audio, and phone lines, and other audio inputs.
- D. Manufacturers:
 - 1. Verint (Currently installed)
 - 2. NICE
 - 3. JEI Communications
 - 4. CVDS
 - 5. Telex
 - 6. or equivalent

2.04 Antenna System:

- A. Each transceiver radio shall have a dedicated antenna on the roof of the ATCT.
- B. New VHF antennas for each for the transceiver radios shall have the following characteristics at a minimum:
 - 1. Gain: 3 dBd
 - 2. Polarization: Vertical
 - 3. Maximum VSWR: $\leq 1.5:1$
 - 4. Impedance: 50 Ω
 - 5. Azimuth Pattern: Omni
 - 6. Lightning Protection: Direct Ground or Manufacturer Provided
 - 7. Minimum Wind Rating (w/o ice): 150 mph

- C. The RF power level output of the transmitter should be capable of producing the Effective Radiated Power (ERP) level at the antennas for which the frequencies are currently licensed.
- D. Antennas shall be located on the ATCT roof in locations to maximize coverage to the service area and minimize interference with other antennas. The minimum antenna coverage shall be a 3 miles ground radius from the ATCT, and double the Class D airspace around the SLF.
- E. Vendors shall confirm that their equipment will be able to function without interference being introduced by other nearby frequencies. For instance, the Tower-to-Ground and the Air/Emergency Guard frequencies are only 250 kHz apart. If the proposed base station equipment cannot operate without interference from potential interfering frequencies, then external filtering must be provided to allow concurrent operation.

2.05 Coax Cables:

- A. Existing coaxial cables may be re-used where practical to do so. All existing coaxial cables that are re-used shall be tested for correct functionality before the transceiver radios are installed. All unused cables shall be properly labeled at both ends for ease of identification for future use and bundled. Unused cables within equipment racks shall be removed.
- B. If new coaxial cables are required they shall have the following characteristics at a minimum:
 1. Jacket: Halogenated, Fire-Retardant, Plenum Rated
 2. Outer Conductor Material: Corrugated Aluminum or Corrugated Copper
 3. Inner Conductor Material: Copper-Clad Aluminum Wire
 4. Impedance: 50 ± 2.0

2.06 Splitters, Couplers, Attenuators

- A. Any splitters, coupler, attenuators, or additional equipment that is required for the radio communications system shall have the following characteristics at a minimum:
 1. Maximum VSWR: $\leq 1.5:1$
 2. Impedance: 50Ω

2.07 System Wiring:

Wire type, gauge, insulation, etc. shall be furnished as required and as recommended by the system supplier for a complete and operational system.

2.08 Emergency Tunable Radio:

- A. Quantity – One (1) emergency radio that can be used in the event of a catastrophic failure of the communication system at the tower shall be provided. The tunable radio must be able to

be moved to a safe location, if necessary, and set up to perform continued communications on the SLF frequencies.

- B. Characteristics – The emergency radio shall consist of radio system components that are consolidated into a ruggedized case with controls accessible from the exterior of the case. These system components include:
 - 1. Transceiver radio that can be tuned to the SLF frequencies
 - 2. Radio speaker
 - 3. Antenna connection mounted on the case
 - 4. Antenna
 - 5. DC power supply (both a battery and an AC/DC converter for use when AC Power is available)
- C. Compliance – The transceiver radio shall be in compliance with all FCC and FAA regulations.
- D. Manufacturers / models
 - 1. Dittel FSG2T
 - 2. ICOM IC-A120
 - 3. Flightline FL-M1000A
 - 4. or equivalent

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Configure, install, interconnect, and test all system equipment as specified.
- B. Provide labor, materials and equipment necessary to furnish and install the radio communications system as specified.
- C. Remove equipment that will be replaced. The equipment removed shall be properly stored in a location designated by Space Florida at the SLF.
- D. Install in accordance with the manufacturer's instructions and locate equipment as indicated, unless otherwise directed.
- E. Installation shall include the delivery, unloading, setting in place, fastening to walls, floors, ceiling, or other structures and where required, penetration fire-stop, interconnecting wiring of the system components, equipment alignment and adjustments, and all other work whether or not expressly required herein which is necessary to result in complete operational radio system.
- F. Furnish and install any necessary wire and cable.
- G. All coax cables the integrator installs shall be handled in accordance with the manufacturers guidelines. Transmission line cables have minimum bending radius specifications that shall be followed. In the event a cable is kinked or bent excessively during installation that section of cable cannot be used, even if subsequently straightened. The damaged cable shall be removed and a new coax cable installed. Ultimately the cable must pass the testing and meet the manufacturer's requirements.

- H. All coax cable shall be tested to meet the manufacturer's specifications during installation. Coax cable not meeting the manufacturer's specifications shall be removed and a new coax cable shall be installed.
- I. Cables shall be properly supported with dedicated hangers or brackets. Cable trays shall be used only if they are dedicated low voltage trays and only with approval from the owner.
- J. Radio communications cabling shall not be grouped with electrical cabling. It can only share sleeves and raceways with other low voltage data and communications cables.
- K. Fastenings and supports shall be adequate to support their loads with a safety factor of at least three.
- L. Installation shall be in accordance with the NEC and Motorola's R56 Standards.
- M. Provide terminal blocks for necessary interconnecting wiring.
- N. Secure cable bundles with cable ties. Provide support bars in enclosures for cable bundles.
- O. Label all system component and antenna cables.
- P. All cables, regardless of length, shall be marked with cable markers reading "Radio Communications System", at regular intervals every 30 ft. or less. There shall be no unmarked cables at any place in the system. In addition, markings codes at each end of the cables and patch panels shall correspond to codes shown on drawings and/or run sheets.
- Q. Terminate spare equipment outputs with appropriate terminators.
- R. Provide continuous cable between equipment and/or terminals.
- S. All power dividers shall be securely mounted in place either by bolting the mount to a solid surface or securing each by suspension on the cables within 4 inches of each connector termination at the power divider. The coax cables connecting to the device shall be routed in the shortest possible path.
- T. All radio transceivers and console interfaces shall be programmed and configured to properly operate on the radio system.
- U. The vendor/integrator shall ensure that the frequencies on the radio communication systems are not interfered with by the SLF radio system or other radio systems.

3.02 TRAINING:

- A. Air Traffic Control Tower (ATCT) Operator Training – Training for the console system and logging recorder shall be provided for the ATCT operators. Training should include hands-on familiarization with the radio, console and voice recorder operations, including all features and functionality of the equipment.

- B. Maintenance Worker Training – Training for radio system maintenance and troubleshooting shall be provided to the SLF maintenance personnel.

3.03 DEMONSTRATION:

A. Start up:

1. Inspect system for conformity and compliance of materials, equipment and construction.
2. Inspect installed equipment and grounding system for proper installation.
3. Energize and verify correct operation of components of system. This operation includes verification of accuracy of interconnecting wiring and cables.
4. Adjust control components to provide stable control of system.
5. Test each radio transceiver for correct output power and receive sensitivity.
6. Test interference performance to verify the radio system does not interfere with the other systems within the facility (Telephone, IP, or Control Systems).
7. Complete all programming required to make the system fully functional.

B. Functional Acceptance Testing:

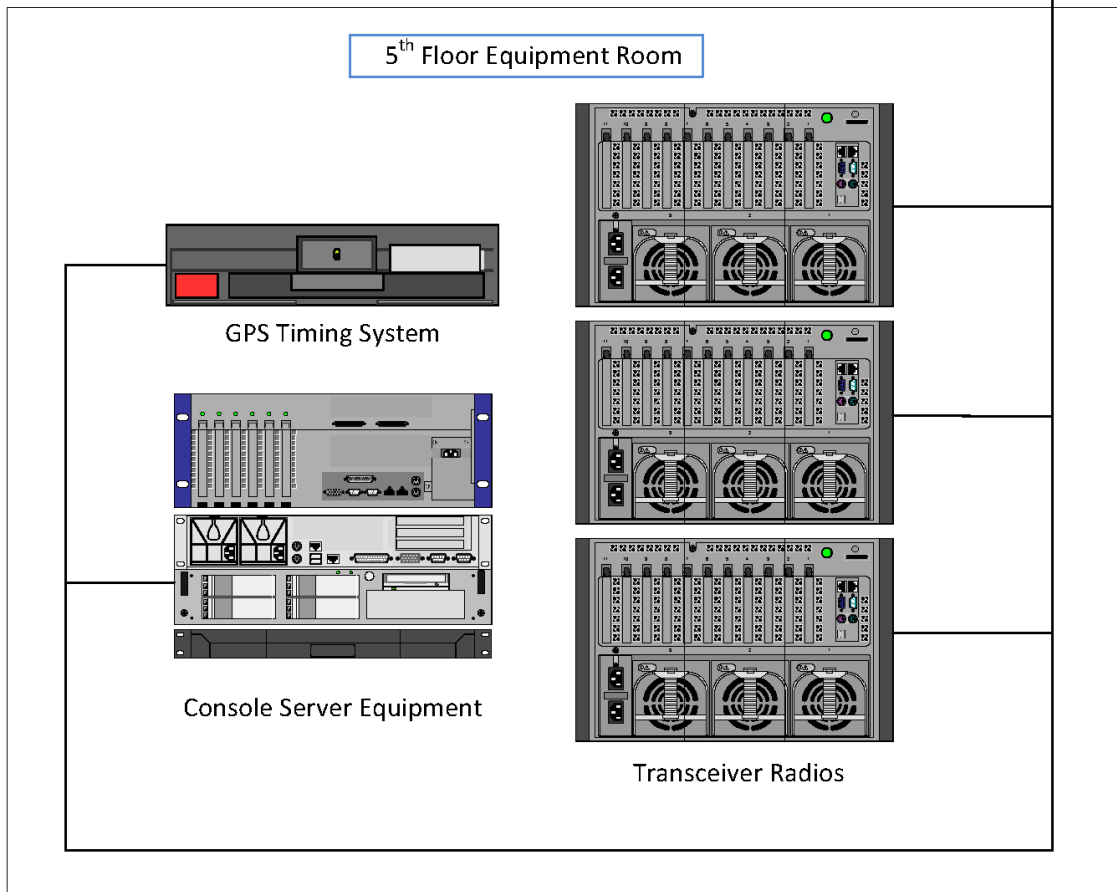
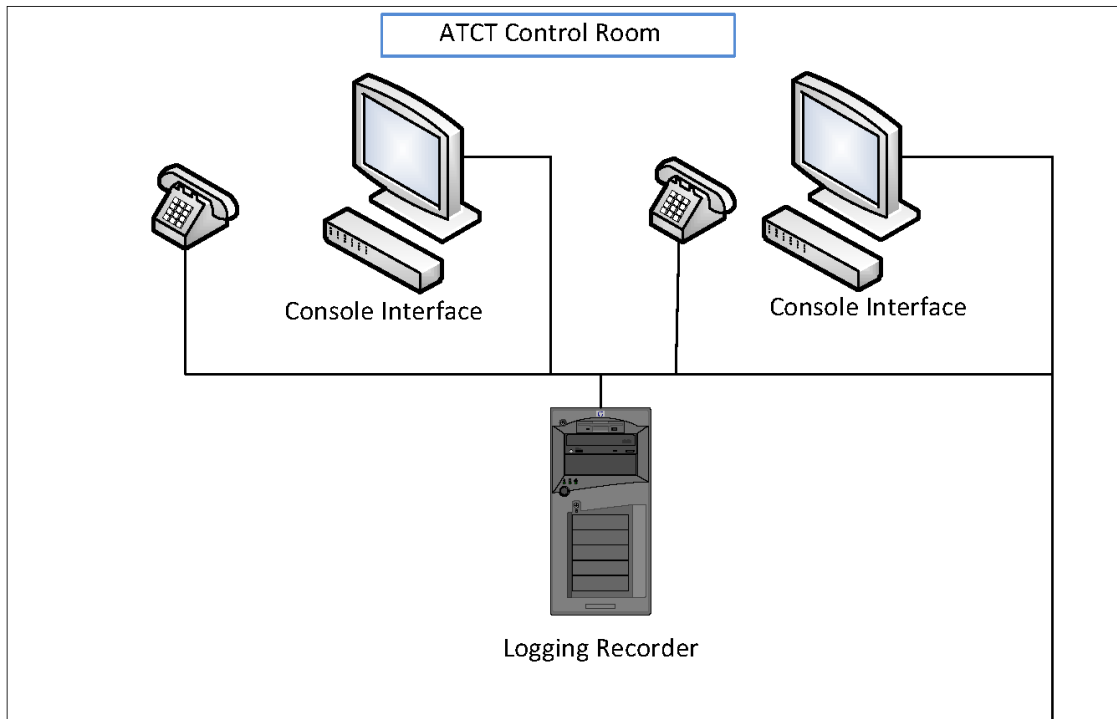
1. Perform Functional Acceptance Testing to test and verify the proper operation of the features and functions of the radio system and components as prescribed in the approved Acceptance Test Plan submitted. Testing shall be witnessed by SLF.
2. Provide any necessary modifications to make sure the system complies with this Specification.

C. Coverage Acceptance Testing:

1. Perform Coverage Acceptance Testing to verify the coverage and voice quality of the radio system as prescribed in the approved Acceptance Test Plan submitted. Testing will be witnessed by SLF.
2. Coverage Acceptance Test Passing Criteria:
 - a. Tower to Ground Frequency (121.750) - All areas throughout the SLF property boundary shall have clear two-way communications to and from the ATCT.
 - b. Tower to Air Frequency (128.550) - The radio system shall provide clear two-way voice communications to aircraft in the Class D Airspace of the SLF.
 - c. The minimum voice quality for all communications shall be:
"Speech understandable with repetition only rarely required, and with little noise and/or distortion."

- d. The radio system shall provide two-way communications without interference or crosstalk from the SLF radio system or other radio systems.
 - e. The coverage test shall be conducted with a portable radio operating on the implemented radio system. The test shall be conducted from representative locations throughout the service areas. The radio will be keyed to verify minimum voice quality to and from the representative locations and the ATCT.
3. Provide any necessary modifications to make sure the system complies with this Specification.

Conceptual Design – Aviation Communications System





Attachment D

Nasa Badge Form

KSC Visitor Pass Request

Fax No. 867-4854

Mail Code: KSC Badging Office

Phone No. 867-7763

Date of Request 11/17/16

Date of Visit: Start Date 11/22/16 End Date 11/22/16

Badge Type: White-Unescorted ☐ Pink-Escorted ☒ Media ☐

Area(s) to be Visited SLF Air Traffic Control Tower J-51197

Purpose of Visit Mandatory Site Visit for: RFP-SF-01-0-2016/JM Shuttle Landing Facility Tower Aircraft Communications Replacements

Job Site Contact Jimmy Moffit

Visitor Information

Name (Last, First, MI) _____

Country of Citizenship _____ Date of Birth _____

Place of Birth (City, State) _____

SSN # _____ Certificate/
Naturalization # _____ Date/
Place _____

Alien Reg. # or _____ Expiration
Permanent # _____ Date _____

Company Name _____

Company Address _____ City _____ State _____ Zip _____

Badging Official Information

Badging Authority Name (typed/printed) Gail Bailey

Badging Authority Company (typed/printed) Space Florida Org. ID _____

Construction Contract No. (if applicable) _____ Code No. 40155

Telephone No. 321-730-5301 Fax No. 321-730-5307 Other No. _____

Badging Authority Signature _____

By my signature, I have confirmed with the requestor the validity of this visit.

WARNING. When filled in, this form contains Personally Identifiable Information (PII) that is subject to Federal law and regulation. PII may be used only as authorized, which includes securing it in accordance with NASA policy and procedural requirements. Penalties for misuse apply. Report suspected misuse immediately to Security Operations Center at 877-NASA-SEC (627-2732).

**The below listing details the Office of Management and Budget's
(OMB) approved documentation required to obtain a
NASA Federal Credential / Photo Identification Badge**

Two identity sources are required

One must be a valid Federal or State government issued picture identification. The other identity source must be one of the following documents:

**List of Acceptable Documents to Accompany
a Federal or State Identification**

- | | | |
|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. U.S. Passport (expired or unexpired) | 8. Driver's license or ID card issued by a state or outlying possession of the United States provided it contains a photograph or information such as name, date of birth, gender, height, eye color, and address | 17. U.S. Social Security Card issued by the Social Security Administration (other than a card stating it is not valid for employment) |
| 2. Unexpired foreign passport, with I-551 stamp or attached Form I-94 indicating unexpired employment authorization | 9. ID card issued by federal, state or local government agencies or entities, provided it contains a photograph or information such as name, date of birth, gender, height, eye color and address | 18. Certification of Birth Abroad issued by the Department of State (Form FS-545 or Form DS-1350) |
| 3. Permanent Resident Card or Alien Registration Receipt Card with photograph (Form I-551) | 10. School ID card with a photograph | 19. Original or Certified copy of birth certificate issued by a state, county, municipal authority or outlying possessions of the United States bearing an official seal |
| 4. Unexpired Temporary Resident Card (Form I-688) | 11. Voter's Registration Card | 20. U.S. Citizen ID Card (Form I-197) |
| 5. Unexpired Employment Authorization Card (Form I-688A) | 12. Military Dependent's ID Card | 21. ID Card for use of Resident Citizens of the United States (Form I-179) |
| 6. Employment Authorization Document (Form I-766) | 13. U.S. Military card or draft record | 22. Unexpired employment authorization document issued by DHS (other than those listed previously) |
| 7. Unexpired Employment Authorization Document issued by DHS that contains a photograph (Form I-688B) | 14. U.S. Coast Guard Merchant Mariner Card | |
| | 15. Native American Tribal Document | |
| | 16. Driver's License Issued by a Canadian government authority | |